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AUTHORS: Andronik, I. K., Kot, M. V., Kretsu, I. V.

TITLE: Thermal dissociation of cadmium and zinc antimonide crystals

SOURCE: Kishinev. Universitet. Uchenyye zapiski. v. 49, 1961, 105-111

TEXT: The irreversible changes occurring in the electric properties of ZnSb and CdSb when these semiconductors are heated above a certain temperature (150°C for CdSb and 100°C for ZnSb) are investigated in detail. The time dependence $\sigma(\tau)$, and the temperature dependence R(T), were measured in CdSb single crystals characterized by $\sigma \approx 0.50$ $(ohm \cdot cm)^{-1}$ and by an acceptor concentration of $N_a \approx 4.0 \cdot 10^{15} cm^{-3}$, also in ZnSb with $\sigma \approx 4.65$ $(ohm \cdot cm)^{-1}$ and $N_a \approx 3.3 \cdot 10^{16} cm^{-3}$. In both cases the $\sigma(\tau)$-curves for annealed samples show saturation after about 20 hrs. When saturation was reached, R(T) was measured both before and after annealing (200°C for CdSb and 295°C for ZnSb). The curves, $\ln R = f(1/T)$, again show saturation, the values of R-const being dependent on annealing. From

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numerical data on hole concentration and conductivity it can be seen that both σ and n increase after annealing in the low temperature range, but their values slowly decrease when the annealed crystals are held at room temperature for a longer period. These changes are caused by thermal dissociation, i. e. thermal motion raises the number of interstitial atoms (Frenkel' defects) which act as additional "impurities". When the crystal is cooled down these atoms return very slowly to free sites. The dissociation energy was found to be 0.45 ev for CdSb and 0.5 ev for ZnSb, the Frenkel' defect concentration at 20°C was $4.1 \cdot 10^{15}$ and $3.3 \cdot 10^{16} cm^{-3}$, respectively. There are 6 figures.

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